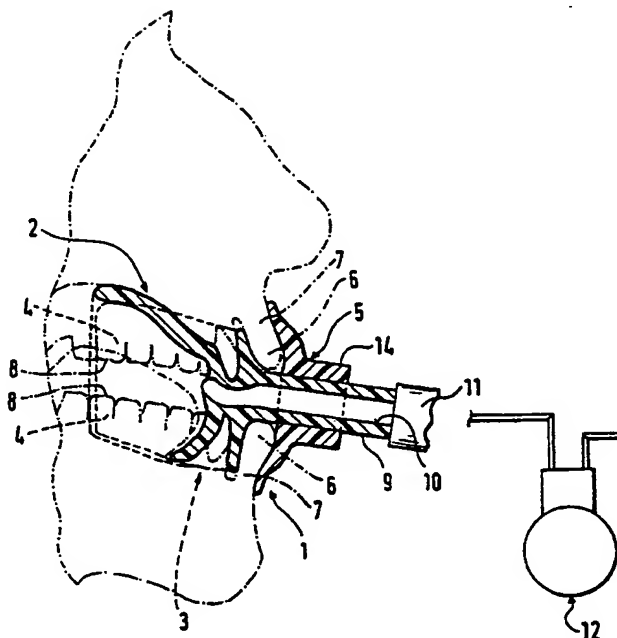




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>4</sup> :</b><br><br><b>A61M 16/06, 16/04</b>  | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 90/03199</b><br><br><b>(43) International Publication Date:</b> <b>5 April 1990 (05.04.90)</b>   |
| <b>(21) International Application Number:</b> PCT/SE89/00500<br><b>(22) International Filing Date:</b> 19 September 1989 (19.09.89)<br><br><b>(30) Priority data:</b><br>8803304-8                      19 September 1988 (19.09.88) SE<br><br><b>(71) Applicant (for all designated States except US):</b> FÖRENING-<br>EN LIM [SE/SE]; Infektionskliniken, Malmö Allmänna<br>Sjukhus, S-214 01 Malmö (SE).<br><br><b>(72) Inventor; and</b><br><b>(75) Inventor/Applicant (for US only) :</b> BRANTBY, Rolf [SE/<br>SE]; Apoteksgatan 10, S-216 14 Malmö (SE).<br><br><b>(74) Agents:</b> WAGNER, Heinz et al.; H Wagner & Co AB,<br>Norra Vallgatan 72, S-211 22 Malmö (SE).   |           | <b>(81) Designated States:</b> AT (European patent), AU, BE (Euro-<br>pean patent), CH (European patent), DE (European pa-<br>tent), DK, FI, FR (European patent), GB (European pa-<br>tent), IT (European patent), JP, LU (European patent),<br>NL (European patent), NO, SE (European patent), US.<br><br><b>Published</b><br><i>With international search report.</i><br><i>With amended claims.</i><br><i>In English translation (filed in Swedish).</i> |
| <b>(54) Title:</b> NOZZLE<br><br><b>(57) Abstract</b><br><br>The present invention relates to a noz-<br>zle which is adapted to be taken in the mouth<br>and which is connectable to a respirator (12)<br>and adapted to permit passage of air be-<br>tween the respirator and the lungs of a pa-<br>tient, whereby the nozzle includes a base<br>member (2) which is adapted to be disposed<br>in the mouth between the teeth (4) and<br>whereby the nozzle further includes a shield<br>(5) which is adapted to sealingly engage the<br>lips and surrounding face portions from the<br>outside. For preventing the shield (5) from<br>loosing its sealingly engagement from the<br>outside with the lips and surrounding face<br>portions while asleep, the base member (2) is<br>individually adapted to the patient's teeth (4)<br>by having tooth impressions (8) adapted to<br>the teeth such that the base member (2) re-<br>tains said teeth (4) in said impressions (8)<br>when the patient is asleep. |           |  |



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Nozzle.

The present invention relates to a nozzle which is adapted to be taken in the mouth and which is connectable to a respirator and adapted to permit passage of air between the respirator and the lungs of a patient, whereby the nozzle includes a base member which is adapted to be disposed in the mouth between the teeth and whereby the nozzle further includes a shield which is adapted to sealingly engage the lips and surrounding face portions from the outside.

5 A nozzle of the abovementioned type is substantially already known from e.g. US-A-4 495 945. The nozzle according to this publication however, has that drawback that the mouth of the patient can open while asleep, whereby the grip about the nozzle ceases and  
15 air may leak out. Hereby, there is an obvious risk of loosing the major part of the air from the respirator.

US-A-3 774 618 relates to a nozzle which is kept in position by means of a strap which is tightened around the head of the patient. This strap holds the  
20 nozzle in the intended position, but does not prevent the mouth of the patient from opening when the patient relaxes in the sleep. Consequently, there is also here an obvious risk for air from the respirator leaking out.

25 The problem with air leakage has actually been so great that one has been forced to make surgical operations in the throat of the patient for supplying air from the respirator in this way. However, for obvious reasons, such an operation give rise to many problems.

30 The object of the present invention is therefore, at first hand, to see to that the patient is supplied with air from the respirator the natural way, i.e. through the mouth, without the risk of leakage while asleep, instead of making any surgical operations in  
35 the throat. This is arrived at according to the invention substantially while the nozzle has obtained the

characterizing features of claim 1.

The above and remaining characterizing features will be further described below with reference to the accompanying drawings, in which

5       fig. 1 is a perspective view of an embodiment of separated base member and shield forming part of a nozzle according to the invention;

      fig. 2 is a plan view of base member and shield when connected together; and

10       fig. 3 is a section through the nozzle in operating position.

      The nozzle with these features sees to that the risk of air leakage, i.e. the risk of so called dead-space, is eliminated without the necessity of surgical  
15       operations in the patient's throat.

      The nozzle illustrated in the drawings is adapted to be taken in the mouth and connected to a respirator. The nozzle is adapted to be used by patients which during the nights, while asleep, tend to get a deficit of  
20       oxygen ( $PO_2$ -deficit) in the blood or excess of oxygen ( $PO_2$ -excess) because of e.g. bad lungs, wrong or blocked signals from the brain or other reasons giving wrong blood gases. For connection of the respirator and for allowing air passage between the respirator and the lungs  
25       of the patients, the nozzle has an opening or coupling of any suitable construction. Especially from fig. 3 it is apparent that the nozzle 1 also comprises a base member 2 which is adapted to be disposed in the mouth 3 between the teeth 4 of the patient, and a shield 5 which is  
30       adapted to sealingly engage the lips 6 and surrounding portions 7 of the face of the patient from the outside and prevent leakage of air beside the shield.

      The base member 2 of the nozzle 1 is individually adapted to the patient's teeth 4 in the upper as well as  
35       lower jaw for obtaining a locking of the teeth in the base member. Thus, the base member 2 prevents opening of the patient's mouth 3 during sleep when the muscles of the patient relax, to such an extent that the shield 5

looses its sealing function. Individual adaptation of the base member 2 to the patient's teeth 4 is accomplished by providing the base member with exact impressions 8 of the teeth. These impressions 8 in the base member are obtained in a manner already known and are therefore not further described. It is essential however, that the impressions 8 are designed such that the patient must bite to move the teeth into the impressions and that the base member can be removed from the teeth only by overcoming a certain resistance when removing said base member by hand. Thus, the impressions 8 in the base member 2 must be adapted to the patient's teeth 4 such that the base member is secured in position when the patient is asleep. By manufacturing the base member 2 of a special rubber or plastic material with a dull surface, the achievement of the object is facilitated.

In the embodiment illustrated in the drawings, the base member 2 is individually adapted to all teeth 4 in the patient's upper and lower jaws, but of course, other embodiments are also possible, e.g. a base member only for the front teeth and molars in the upper and lower jaws.

According to the present embodiment of the invention, the shield 5 and base member 2 are provided as two separate members which are connectable to each other. These may be locked by means of a sleeve or agglutinated. Hereby, the shield 5 is disposable at various distances from the tooth impressions 8 in the base member 2 for individual adaptation of the position of the shield in relation to shape and/or thickness of the patient's lips 6 and surrounding face portions 7. Thus, the shield 5 may be positioned with sufficient sealing against the lips 6 and surrounding face portions 7 without e.g. squeezing the lips between the shield 5 and base member 2. However, if desired, it is also possible to manufacture shield 5 and base member 2 in one piece. In the embodiment shown however, the shield 5 is threadable onto a

tube 9 protruding from the base member 2 between the impressions 8 for the teeth in the upper and lower jaws, said tube 9 defining the opening 10 for permitting air passage between a respirator and the patient's lungs and to which a hose 11 from the respirator 12 is connected. The respirator 12 is also connected to e.g. the electric mains via a conduit 13. In order to facilitate the threading of the shield 5 onto the tube 9 on the base member 2 as well as its setting in correct operating position, the shield also has a tubular portion 14 which is thread onto the tube 9. For permitting fixation of the shield 5 at various locations along the tube 9, said tube 9 and the tubular portion 14 have suitable lock means for this purpose, e.g. a corresponding tothing 15 on each member.

In use, the nozzle 1 is applied such that the base member 2 is put into the mouth 3 of the patient, whereafter the patient bites in said base member such that the teeth 4 are pressed down into the impressions 8 in the base member. The teeth can now be withdrawn from the base member 2 if the patient generates a certain force for this purpose. Thereafter, the shield 5 is thread onto the tube 9 on the base member 2 and moved therealong until it sealingly engage the patient's lips 6 and surrounding face portions 7. In this position, the shield 5 is kept in position by means of the tubular portion 14 and the tothing 15 thereon and on the tube 9. The hose 11 to the respirator 12 is fastened to the tube 9 and the respirator is switched on.

It is obvious for a skilled person that the present invention can be modified within the scope of the following claims without departing from the idea and purpose of the invention. Thus, the base member and the shield to the nozzle can be manufactured in a suitable material and given a design and size suitable for the purpose. Respirator coupling and eventual lock means can also be designed as desired or required for the purpose.

## Claims:

1. Nozzle which is adapted to be taken in the mouth and which is connectable to a respirator (12) and adapted to permit passage of air between the respirator and the lungs of a patient, whereby the nozzle includes a base member (2) which is adapted to be disposed in the mouth between the teeth (4) and whereby the nozzle further includes a shield (5) which is adapted to sealingly engage the lips and surrounding face portions from the outside, c h a r a c t e r i z e d in that the base member (2) is individually adapted to the patient's teeth (4) by having tooth impressions (8) adapted to the teeth such that the base member (2) retains said teeth (4) in said impressions (8) when the patient is asleep in order to prevent the shield (5) from losing its sealingly engagement with the lips and surrounding face portions while asleep.

2. Nozzle according to claim 1, c h a r a c t e r i z e d in that the tooth impressions (8) of the base member (2) are individually adapted to all teeth (4) of the patient.

3. Nozzle according to claim 1 or 2, c h a r a c t e r i z e d in that the shield (5) and base member (2) consist of two interconnectable members, whereby the shield (5) is disposable at various distances from the tooth impressions (8) in the base member (2) for individual adaptation of the position of the shield (5) relative to the patient's lips (6) and surrounding face portions (7).

4. Nozzle according to claim 3, c h a r a c t e r i z e d in that the shield (5) is threadable onto a tube (9) protruding from the base member (2) and to which a hose (11) from the respirator (12) is connectable, whereby the shield (5) is fixable at various locations along the tube.

## AMENDED CLAIMS

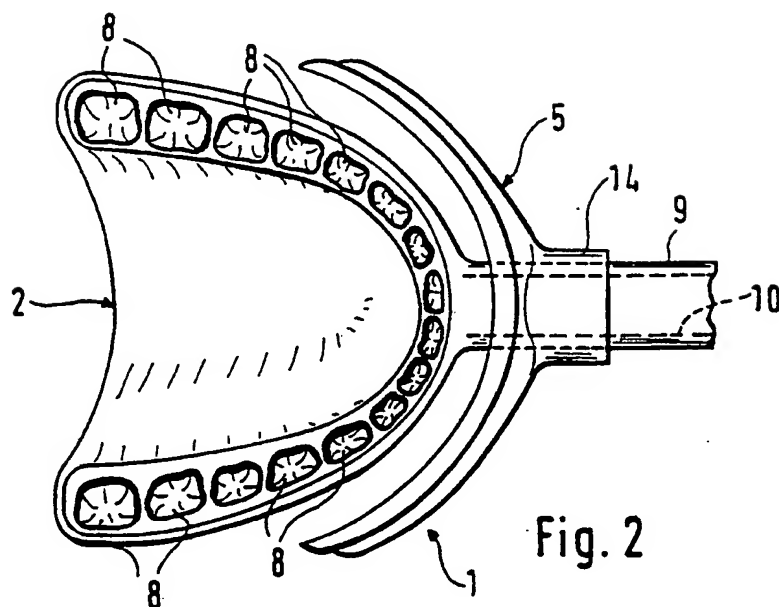
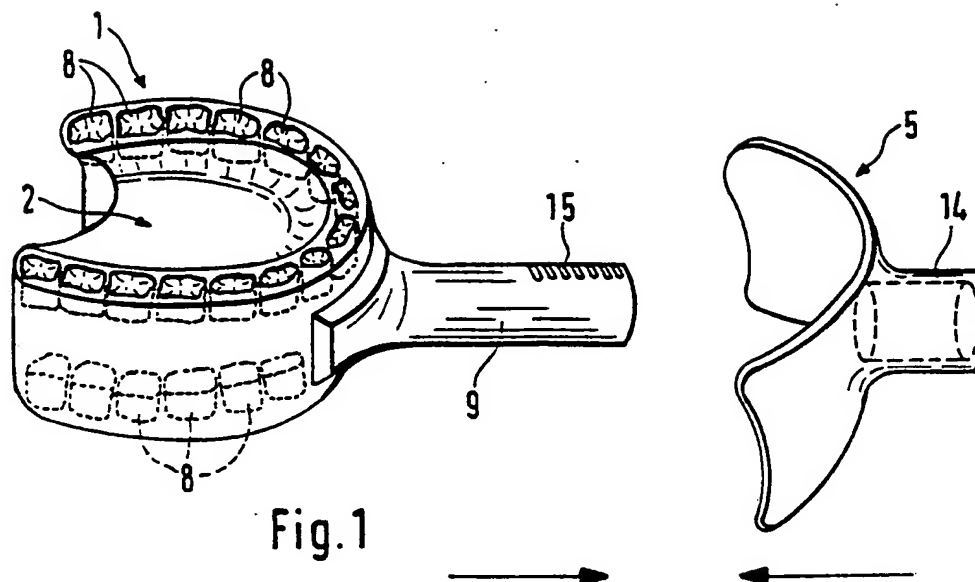
[received by the International Bureau on 5 February 1990 (05.02.90)  
original claims 1-4 replaced by amended claims 1 and 2 (1 page)]

1. Nozzle which is adapted to be taken in the mouth and which is connectable to a respirator and adapted to permit passage of air between the respirator and the lungs of a patient, whereby the nozzle includes a base member which is adapted to be disposed in the mouth of the patient and which has impressions after the teeth of the patient, and whereby the nozzle further includes a shield which is adapted to sealingly engage the lips and surrounding face portions from the outside, c h a r a c t e r i z e d i n that the shield (5) and base member (2) consist of two interconnectable members, whereby the shield (5) is disposable at various distances from the tooth impressions (8) in the base member (2) for individual adaptation of the position of the shield (5) relative to the patient's lips (6) and surrounding face portions (7) for sealingly engagement therewith, and whereby the tooth impressions (8) are individually adapted to the patient's teeth (4) such that the base member (2) retains said teeth (4) in said impressions (8) when the patient is asleep in order to prevent the shield (5) from losing its sealingly engagement with the lips and surrounding face portions while asleep.

2. Nozzle according to claim 1, c h a r a c t e r i z e d i n that the shield (5) is threadable onto a tube (9) protruding from the base member (2) and to which a hose (11) from the respirator (12) is connectable, whereby the shield (5) is fixable at various locations along the tube.



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SUBSTITUTE SHEET

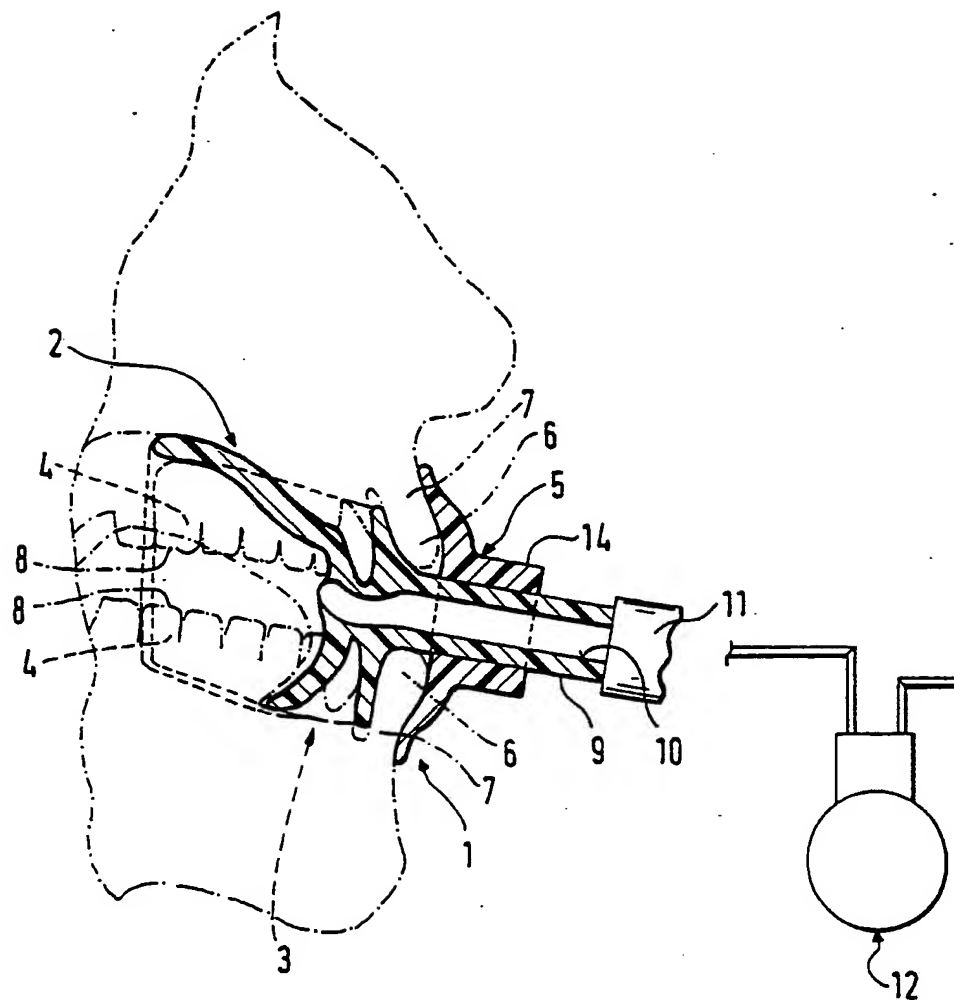


Fig. 3

# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 89/00500

|  |  |                                     |
|--|--|-------------------------------------|
| <b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>  |  |                                     |
| According to International Patent Classification (IPC) or to both National Classification and IPC<br>IPC4: A 61 M 16/06, A 61 M 16/04  |  |                                     |
| <b>II. FIELDS SEARCHED</b>   |  |                                     |
| Minimum Documentation Searched <sup>7</sup>  |  |                                     |
| Classification System  | Classification Symbols   |                                     |
| IPC4   | A 61 M   |                                     |
| Documentation Searched other than Minimum Documentation<br>to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>  |  |                                     |
| SE,DK,FI,NO classes as above   |  |                                     |
| <b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>   |  |                                     |
| Category <sup>10</sup>   | Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup> | Relevant to Claim No. <sup>13</sup> |
| X  | US, A, 4495945 (LIEGNER) 29 January 1985,<br>see column 5, line 3 - line 12                                    | 1-2                                 |
| Y  | --   | 3-4                                 |
| Y  | US, A, 3139088 (E.A. GALLEHER, JR)<br>30 June 1964,<br>see detail 14   | 3-4                                 |
|  | --   |                                     |
| A  | US, A, 3107667 (E.R. MOORE) 22 October 1963,<br>see the whole document --                                      | 1-2                                 |
| A  | US, A, 3768465 (HELMER) 30 October 1973,<br>see the whole document --  | 1-2                                 |
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| <p><sup>10</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> |  |                                     |
| <b>IV. CERTIFICATION</b>   |  |                                     |
| Date of the Actual Completion of the International Search<br>7th December 1989   | Date of Mailing of this International Search Report<br>1989 -12- 0 8   |                                     |
| International Searching Authority<br>SWEDISH PATENT OFFICE   | Signature of Authorized Officer<br>Leif Karnsäter <i>Leif Karnsäter</i>  |                                     |

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 89/00500

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---------------------|----------------------------|---------------------|
| US-A- 4495945                             | 29/01/85            | NONE                       |                     |
| US-A- 3139088                             | 30/06/64            | NONE                       |                     |
| US-A- 3107667                             | 22/10/63            | NONE                       |                     |
| US-A- 3768465                             | 30/10/73            | NONE                       |                     |

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